

CLAIMS

1. An optical fiber connector cleaner comprising:

a housing;

5 a cleaning tape winding means and cleaning tape delivery means arranged inside the housing;

a cleaning means having a bar-like cleaning section projecting outwardly from the housing, on the front-end of the cleaning section the cleaning tape delivered from the delivery means being movably mounted under tension in an exposed state, the
10 front-end of the cleaning section being brought into contact with the end surface of an optical fiber connector to thereby clean the end surface;

a cleaning section rotating means coaxially connected to the cleaning section in the housing and rotatably supported with respect to the housing; and

a transmission means which rotates the winding means and the cleaning section
15 rotating means substantially simultaneously in a predetermined direction through a predetermined angle and then reverses the cleaning section rotating means to its original position.

2. An optical fiber connector cleaner comprising:

20 a housing;

a cleaning tape winding means and cleaning tape delivery means arranged inside the housing;

a cleaning means having a bar-like cleaning section projecting outwardly from the housing, on the front-end of the cleaning section the cleaning tape delivered from
25 the delivery means being movably mounted under tension in an exposed state, the front-end of the cleaning section being brought into contact with the end surface of an optical fiber connector to thereby clean the end surface;

a cleaning section rotating means coaxially connected to the cleaning section in the housing and rotatably supported in relation to the housing;

30 a cleaning tape guide means coaxially connected to the cleaning section and rotatably supported in relation to the housing; and

a transmission means which rotates the winding means and the cleaning section rotating means substantially simultaneously in the respective predetermined directions through the respective predetermined angles and then reverses the cleaning section
35 rotating means to its original position.

3. The optical fiber connector cleaner according to claim 1 or 2, wherein the transmission means rotates the winding means, the delivery means and the cleaning tape rotating means substantially simultaneously.

4. The optical fiber connector cleaner according to any of claims 1 to 3, wherein the cleaning section includes a hollow bar-like member and a smooth member arranged at the end of the bar-like member.

5. The optical fiber connector cleaner according to any of claims 1 to 3, wherein the cleaning section includes a hollow bar-like member and a roller rotatably mounted at the end of that bar-like member.

6. The optical fiber connector cleaner according to claim 4 or 5, wherein the main part of the cleaning section is a solid bar-like member.

7. The optical fiber connector cleaner according to claim 1 or 2, wherein the cleaning tape is cloth that has been subject to a fuzz prevention process.

8. The optical fiber connector cleaner according to claim 1 or 2, wherein the cleaning tape is a woven cloth that has been subject to a fuzz prevention process.

9. The optical fiber connector cleaner according to claim 1 or 2, wherein the transmission means includes an arm that rises and lowers in vertical direction, and the transmission means is configured such that due to the downward movement of the arm the winding means is rotated to a first angle in a first direction while simultaneously the cleaning section rotating means is rotated to a second angle in a second direction, moreover due to the upward movement of the arm the cleaning part rotating means is rotated to the second angle in the opposite direction to the second direction.

10. The optical fiber connector cleaner according to claim 1 or 2, wherein the transmission means includes an arm that rises and lowers in vertical direction, and the transmission means is configured such that due to the downward movement of the arm the winding means is rotated to a first angle in a first direction while the cleaning section rotating means is rotated to a second angle in a second direction and simultaneously therewith, the delivery means is rotated to the first angle in a third direction, moreover due to the upward movement of the arm the cleaning part rotating

means is rotated to the second angle in the opposite direction to the second direction.

11. The optical fiber connector cleaner according to claim 9 or 10, wherein the arm of the transmission means has a plurality of notches formed along the longitudinal direction thereof, the cleaning section rotating means has a plurality of protrusions disposed on the external peripheral surface thereof, and when the arm descends the protrusions of the cleaning section rotating means are pushed down in succession by the notches on the arm and the cleaning part rotating means rotates at a determined angle in a determined direction, while when the arm ascends the protrusions of the cleaning section rotating means are pushed up in succession by the notches on the arm and the cleaning section rotating means rotates at a determined angle opposite to that determined direction.

12. The optical fiber connector cleaner according to claim 9 or 10, wherein the arm of the transmission means includes a rack having a plurality of notched grooves, the cleaning part rotating means includes a pinion having a plurality of teeth that engage with the rack, and the cleaning section rotating means rotates in a determined direction or in a direction opposite thereto in response to the ascent or decent of the arm.

13. A method for cleaning the end surface of a ferrule of an optical fiber connector comprising the steps of:

bringing the surface of a cleaning tape into contact with the end surface of a ferrule of an optical fiber connector;

moving the cleaning tape a uniform distance only, in the longitudinal direction thereof; and

rotating the cleaning tape over the connecting surface of the optical fiber connector while the cleaning tape is moving.

14. A method for cleaning the end surface of a ferrule of an optical fiber connector comprising the steps of:

inserting into an optical fiber connector, the end of a cleaning section on which a cleaning tape is movably mounted under tension;

bringing the cleaning tape at the end of the cleaning section into contact with the end surface of a ferrule of the optical fiber connector; and

rotating as well as moving the cleaning tape while the cleaning tape is brought into contact with the end surface of the ferrule.

15. A optical fiber connector cleaner comprising:
a housing of a size that can be held in one hand;
a bar-like cleaning section disposed at the end of the housing and having an
5 axis of extension;
a winding means and a delivery means arranged inside the housing;
a cleaning tape that is wound up by the winding means after being delivered
from the delivery means and being wound around the end of the cleaning section;
a cleaning section rotating means that rotates the cleaning section a determined
10 amount about the axis of extension; and
a manual operating part that drives the cleaning section rotating means
simultaneously with driving the winding means,
wherein the cleaning section includes a bar-like inner guide member around the
side surfaces and end section of which the cleaning tape is arranged, and an outer side
15 guide member that encompasses the inner guide member and the outside of the cleaning
tape with the end of the inner guide member exposed, the inner guide member and the
outer guide member are biased to the direction of the end of the housing, independent of
each other.
- 20 16. The optical fiber connector cleaner according to claim 15, wherein the cleaning
section is supported at the base by a shaft disposed in the housing, and can rotate about
the shaft at a determined angle in relation to the housing.
- 25 17. The optical fiber connector cleaner according to claim 15 or 16, wherein the
optical fiber connector cleaner has a cover that can be attached to and removed from the
cleaning section, the cover includes a tubular part having an insertion hole that can
accommodate the insertion of a terminal of the male side of a connector.
- 30 18. The optical fiber connector cleaner according to claim 17, wherein the cover
includes a cap that covers the insertion hole.
19. A optical fiber connector cleaner for cleaning the end surface of a ferrule of an
optical fiber connector comprising:
a housing;
35 a cleaning section disposed at one end of the housing, said cleaning section
including a bar-like member rotatably supported in the housing about the axis of

extension A of the bar-like member, the cleaning tape being supported at the end of the bar-like member in an exposed state so as to be capable of movement in the lengthwise direction of a cleaning tape;

a movable operating part disposed in the housing;

5 a cleaning section rotation drive means that is connected to the bar-like member and the operating part and rotates the bar-like member about the axis of extension in response to movement of the operating part; and

a winding means that is connected to the operating part, that winds the cleaning tape in response to movement of the operating part and that advances the cleaning tape
10 at the end of the bar-like member.

20. The optical fiber connector cleaner according to claim 19, wherein the cleaning section rotating drive means rotates the bar-like member in the forward direction of the rotation of the axis of extension in response to a first movement of the operating part
15 and rotates the bar-like member in the backward direction returning the bar-like member to their original position in response to a second movement of the operating part,

wherein the winding means has a winding part rotatably supported in the housing that winds the cleaning tape, this winding part rotating in a predetermined direction to wind the cleaning tape in response to either the first or the second
20 movement of the operating part, advancing the cleaning tape at the end of the bar-like member.

21. The optical fiber connector cleaner according to claim 19, wherein the cleaning section rotating drive means includes a pinion disposed at the base of the bar-like
25 member and a rack that engages with the pinion, disposed on the operating part.

22. The optical fiber connector cleaner according to claim 19, wherein the winding means includes:

a winding part rotatably supported on a shaft disposed in the housing, that
30 winds the cleaning tape,

a first rotation drive plate and a second rotation drive plate rotatably supported on the shaft, arranged along the axis of extension of the shaft on the respective sides of the winding part,

a first ratchet mechanism disposed between the winding part and the first
35 rotation drive plate, and

a second ratchet mechanism disposed between the winding part and the second

rotation drive plate,

wherein the first and second ratchet mechanisms convey to the winding part only a rotation in a first rotational direction turning around that shaft.

- 5 23. The optical fiber connector cleaner according to claim 22, wherein the winding means includes a movable member that moves in response to movement of the operating part, the movable member including a first rack that engages a first pinion disposed on the first rotation drive plate and a second rack that engages a second pinion disposed on the second rotation drive plate,
- 10 the first and second racks operating in response to movement of the operating part, to engage the first and second pinions respectively so as to rotate the first and second rotation drive plates in mutually opposite directions.

24. The optical fiber connector cleaner according to claim 21, wherein the cleaning section rotation drive means includes a spring connecting the pinion and the bar-like member respectively.
- 15

25. The optical fiber connector cleaner according to claim 19, wherein the cleaning section includes:
- 20 a guide sleeve respectively that supports the bar-like member, the guide sleeve being rotatably supported in the housing so as to change the angle of the axis of extension in relation to the longitudinal axis of the housing.

26. The optical fiber connector cleaner according to claim 19, wherein the cleaning section includes:
- 25

- a tubular guide sleeve rotatably supported in the housing; and
- a tubular external guide member supported so as to be capable of sliding along the axis of extension along the inner side surface of the guide sleeve and that accommodates the bar-like member and the cleaning tape such that the bar-like member and the cleaning tape are capable of sliding along the axis of extension,
- 30

the bar-like member is connected to the cleaning section rotation drive means via a connecting member thereby enabling it to receive rotational driving force from the cleaning section rotation drive means, and

- the external guide member has an engaging part capable of engaging with a stepped part formed in the guide sleeve and is biased in the direction toward the end of the bar-like members along the axis of extension by spring disposed between the
- 35

external guide member and the bar-like member such that the stepped part and the engaging part engage together.

27. The optical fiber connector cleaner according to claim 19, wherein the cleaning section includes:

a tubular guide sleeve rotatably supported in the housing;

a tubular external guide member supported so as to be capable of sliding along the axis of extension in the inner side surface of the guide sleeve and that accommodates the bar-like member and the cleaning tape such that the bar-like member and the cleaning tape are capable of sliding along the axis of extension; and

a rotary joint supported at the base of the guide sleeve so as to be capable of rotating about the axis of extension, that engages the base of the bar-like member such that the rotation joint and the bar-like member can not move relatively to each other in the circular direction in relation to that axis of extension and can slide along that axis of extension,

the rotation joint means is connected to the cleaning section rotation drive means via a connecting member so as to receive rotational driving force from the cleaning section rotation drive means,

the bar-like member has a flange capable of engaging with an engaging part disposed in the guide sleeve, and is biased in the direction towards the end of the bar-like member along the axis of extension by a spring disposed between the bar-like member flange and the rotation joint such that the bar-like member flange engages with the engaging part, and

the external guide member has a flange capable of engaging with the stepped part formed in the guide sleeve, and is biased in the direction towards the end of the bar-like member along the axis of extension by a spring disposed between the external guide member flange and the engaging part of the guide sleeve such that the external guide member flange engages with the stepped part.

28. The optical fiber connector cleaner according to claim 19, wherein the housing has a long slender form.

29. The optical fiber connector cleaner according to claim 19, wherein the cleaning section rotation drive means is mechanically connected to the bar-like member and the operating part, and

the winding means is mechanically connected to the operating part.